

# Compact Ultrasensitive Erbium-doped Waveguide Optical Gyros, Phase I

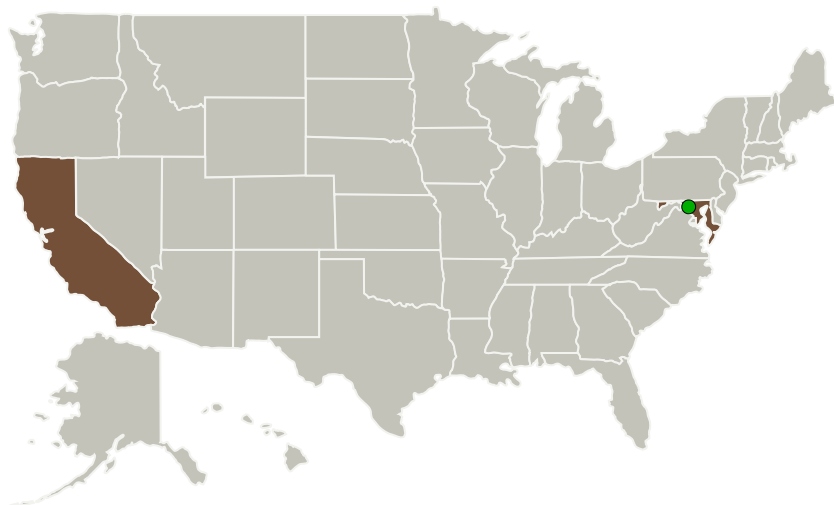
Completed Technology Project (2015 - 2015)




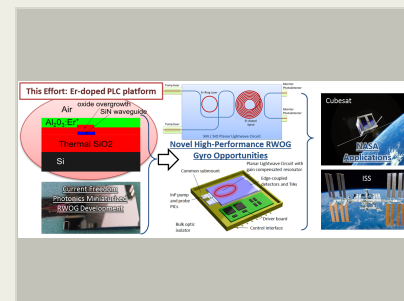
## Project Introduction

In this program, we propose to develop a new photonic-integration platform that incorporates optical gain in resonant waveguide optical gyroscopes. This new photonic integration platform is based on our existing low-loss SiN/SiO<sub>2</sub> PLC photonic integration technology and incorporates a doped Aluminum Oxide layer for gain. One key resonant waveguide optical gyro design constraint is the relationship between the waveguide length, which can increase the Sagnac effect, and waveguide loss, which decreases the gyro resolution. Freedom Photonics' low loss SiN PLC platform is clearly an adequate path forward for record-breaking Gyro performance. With introduction of gain into the PLC, new possibilities arise for enhanced sensitivity, simplified control electronics, and ultra compact and robust designs.

## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Freedom Photonics, LLC	Lead Organization	Industry	Santa Barbara, California
 Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland



Compact Ultrasensitive Erbium-doped Waveguide Optical Gyros, Phase I

## Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

# Compact Ultrasensitive Erbium-doped Waveguide Optical Gyros, Phase I

Completed Technology Project (2015 - 2015)



## Primary U.S. Work Locations

California

Maryland

## Project Transitions

**June 2015:** Project Start

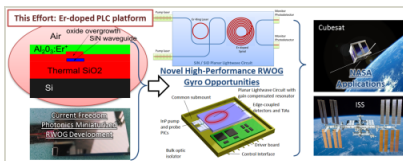
**December 2015:** Closed out

**Closeout Summary:** Compact Ultrasensitive Erbium-doped Waveguide Optical Gyros, Phase I Project Image

### Closeout Documentation:

- Final Summary Chart Image(<https://techport.nasa.gov/file/138888>)

## Images



### Briefing Chart Image

Compact Ultrasensitive Erbium-doped Waveguide Optical Gyros, Phase I

(<https://techport.nasa.gov/image/131810>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

Freedom Photonics, LLC

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

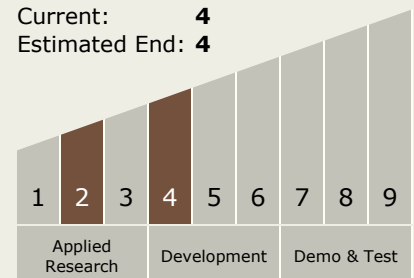
Carlos Torrez

### Principal Investigator:

Gordon Morrison

## Technology Maturity (TRL)

Start: 2  
Current: 4  
Estimated End: 4



# Compact Ultrasensitive Erbium-doped Waveguide Optical Gyros, Phase I

Completed Technology Project (2015 - 2015)



## Technology Areas

### Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
  - └ TX17.2 Navigation Technologies
    - └ TX17.2.3 Navigation Sensors

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System